

**REMARKS**

After entry of the present Amendment, claims 1, 2, 5-10, 14-17 and 19 remain pending in the present application with claim 1 in independent form. Independent claim 1 has been amended to incorporate the elements of dependent claim 4 therein. Claims 3 and 4 have been cancelled through the present Amendment. Claims 11-13 and 18 was previously cancelled. No new claims have been added.

Claims 1, 3, 6, 9, and 10 stand rejected under 35 U.S.C. §102(b) as being anticipated by Nagata et al. (JP 56-166230). Claims 1-8 and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the article entitled “Plasma Spray Synthesis of Nanomaterial Powders and Deposits” to Karthikeyen et al. in view of Japanese Patent Publication Nos. 11-198281 and 11-256338, both to Bessho. Claims 15-17 stand rejected under 35 U.S.C. §103(a) over Karthikeyen et al. in view of the Bessho references and further in view of PCT Publication No. WO2002/35576. Claim 19 has been indicated as allowable.

In view of the incorporation of the elements of claim 4 into independent claim 1, the Applicants respectfully assert that the rejections under 35 U.S.C. §102(b) over Nagata et al. are moot because claim 4 was not rejected over Nagata et al. Thus, the only remaining rejections are those under 35 U.S.C. §103(a) over the combination of Karthikeyen et al. and the Bessho references, which the Applicants continue to traverse.

**Rejections Under 35 U.S.C. §103(a)**

As to these rejections, the Applicants previously argued that when Karthikeyen et al. and the Bessho references are considered as a whole, there are no reasons for the combination of

Karthikeyen et al. and the Bessho references and, further, that one of skill in the art would **not** have a reasonable expectation of success in obtaining the product of Karthikeyen et al. by using non-thermal equilibrium plasmas of the Bessho references. As such, the Applicants submitted that the prior reasons set forth by the Examiner to support combination of Karthikeyen et al. and the Bessho references were invalid. Presently, the Examiner has provided additional reasoning to support combination of Karthikeyen et al. and the Bessho references, to which the Applicants now rebut.

With regard to the combination of Karthikeyen et al. and the Bessho references, the Examiner has opined that it would be obvious not only to substitute the process of the Bessho references into the disclosure of Karthikeyen et al., but it would also be obvious to introduce the precursor of Karthikeyen et al. as a gas entrained “neat” sample with no need for solvent that must be evaporated out of the sprayed liquid (thus providing a way to eliminate the need for high temperatures in the process of Karthikeyen et al.). As a basis for arguing that the precursor of Karthikeyen et al. can be introduced as a gas entrained “neat” sample, the Examiner has argued that one of ordinary skill would understand that the precursor should be introduced as a neat sample per the teachings of Bessho instead of as a solution.

The Applicants respectfully submit that the Examiner’s position remains at odds with the actual teachings of Karthikeyen et al. In particular, **the Bessho references are drawn to a different application** (i.e., to the art of gas barrier films) **from Karthikeyen et al.**, which is drawn to the synthesis of nanomaterial powders, and one of skill in the art would have **no reason to expect successful production of nanomaterials in Karthikeyen et al. by replacing**

**the high temperature plasma of Karthikeyen et al. with the low temperature plasma of the Bessho references and eliminating solvent from the liquid feedstock or precursor of Karthikeyen et al.**

The Applicants respectfully submit that the Examiner has no basis for concluding that solvents can be omitted from the precursor of Karthikeyen et al. In fact, the teachings of Karthikeyen et al. make clear that solvent is required in order to synthesize nanomaterials with consistent characteristics. Referring to Karthikeyen et al., Karthikeyen et al. is very specific as to the necessary spray parameters that are required to synthesize nanomaterials with consistent characteristics. In particular, Karthikeyen et al. was careful to note that “[s]pray synthesis of nanomaterials with consistent characteristics requires control of the size and size distribution of atomized liquid droplets and optimization of the spray parameters” (see page 277 of Karthikeyen et al. directly under the sub-heading “2.4 Specimen preparation and characterization”). Notably, concentration and feed rate of the liquid feedstock is a key parameter for controlling droplet size of the aerosols, **which clearly suggests that the liquid feedstock cannot be prepared without solvent.** Further, when the nanomaterials are formed from alumina, the concentration of alumina in the liquid feedstock is very low (i.e., 1.5%, refer to page 281 of Karthikeyen et al. directly under the heading “4.1 Alumina”). While Karthikeyen et al. does not appear to provide optimized concentrations of the other precursors that are taught therein (i.e., zirconia and Ytria-stabilized zirconia), the concentration of alumina in the liquid feedstock is clearly characteristic of the feed stocks used in Karthikeyen et al. As such, it is clear that solvent **cannot** be eliminated from the liquid feedstock or precursor of

Karthikeyen et al. without fundamentally impacting production of nanomaterials, and it is unclear whether or not nanomaterials could even be prepared by eliminating the solvent from the liquid feedstock or precursor taught by Karthikeyen et al. The Bessho references are directed to formation of gas barrier films, as opposed to nanomaterials, and the gas barrier films do not rely on size and size of atomized liquid droplets to achieve proper formation of the gas barrier films. As such, even assuming proper combination of Karthikeyen et al. and the Bessho references, one of ordinary skill would still be taught to include solvent in the liquid feedstock or precursor of Karthikeyen et al. for the purpose of optimizing concentration thereof and to control size and size distribution of atomized liquid droplets of the liquid feedstock or precursor, as is necessary to obtain consistent characteristics of the desired nanomaterials.

In view of the foregoing, the Applicants respectfully assert that independent claim 1, as well as the claims that depend therefrom, is in condition for allowance, which allowance is respectfully requested.

It is believed that the instant Amendment is timely filed, and the appropriate fee for a Request for Continued Examination (RCE) is included herewith. The Commissioner is authorized to charge any additional fees, or credit any overpayments to Deposit Account No. 08-2789 in the name of Howard & Howard.

**Respectfully submitted,**

**HOWARD & HOWARD ATTORNEYS**

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Date

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